ISSN 2692-5877
DOI: 10.46998/IJCMCR.2026.61.001520

International Journal of
Clinical Studies & Medical Case Reports

Research Article

Temporal Trends and Epidemiological Characteristics of Dermoscopically Evaluated Skin Lesions: A Retrospective Analysis of 1,219 Consecutive Patients

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Received: September 21, 2026 Published: November 16, 2026

Abstract

Background: Dermoscopy is widely used for the evaluation of melanocytic and non-melanocytic skin lesions. Although its diagnostic performance has been extensively investigated, longitudinal data describing the spectrum and temporal distribution of dermoscopically evaluated lesions in Albania, remain limited.

Objective: To characterize the diagnostic distribution, demographic characteristics, and temporal patterns of dermoscopically evaluated skin lesions at a dermatology referral center in Albania over a six-year period.

Methods: This retrospective observational study included 1,219 consecutive patients evaluated at "EB Dermatology Clinic", Tirana, Albania, between January 2020 and December 2025. Each patient contributed one clinically selected skin lesion, resulting in 1,219 lesions and 1,219 corresponding dermoscopic diagnoses. The six-year period was divided into three consecutive two-year intervals: 2020–2021, 2022–2023, and 2024–2025.

Results: Benign melanocytic and dermal lesions were the most frequent diagnostic category (415/1,219; 34.0%), followed by other dermatological diagnoses (254; 20.8%), basal cell carcinoma (BCC) (173; 14.2%), dysplastic nevi (132; 10.8%), melanoma (88; 7.2%), premalignant melanocytic and keratinocytic lesions (88; 7.2%), and squamous cell carcinoma (SCC) (69; 5.7%). The absolute number of melanoma diagnoses was 36 in 2020–2021, 33 in 2022–2023, and 29 in 2024–2025, while melanoma represented 7.2%, 7.9%, and 9.6% of all evaluated lesions in the respective periods. Most melanoma diagnoses (78/88; 88.6%) occurred in patients older than 25 years. SCC showed a significantly greater male predominance than BCC ($p = 0.024$).

Conclusion: The diagnostic spectrum of dermoscopically evaluated lesions showed temporal and demographic variation over the six-year study period. The increasing proportion of melanoma among evaluated lesions should not be interpreted as an increase in population-level melanoma incidence because the overall number of patients evaluated declined over time. These findings provide referral-based data from Albania and contribute to addressing the limited evidence on dermoscopic diagnostic patterns in Southeastern Europe.

Keywords: Dermoscopy; Melanoma; Basal cell carcinoma; Squamous cell carcinoma; Skin lesions; Albania; Epidemiology

Introduction

Dermoscopy is a widely used non-invasive technique for the evaluation of melanocytic and non-melanocytic skin lesions. By allowing visualization of subsurface morphological structures that are not readily visible to the naked eye, dermoscopy provides additional diagnostic information during the clinical assessment of suspicious lesions. Evidence from systematic reviews and diagnostic studies has demonstrated that dermoscopic examination can improve diagnostic performance for melanoma and other skin cancers compared with naked-eye examination alone [1,2]. These established findings provide the clinical rationale for the widespread use of dermoscopy; however, diagnostic accuracy was not directly evaluated in the present study. Previous research has focused extensively

on the diagnostic performance of dermoscopy, melanoma recognition, and the epidemiology of melanoma and keratinocyte carcinomas. Studies have also reported earlier detection of melanoma and changes in melanoma incidence and mortality in several populations [3-5]. However, important questions remain regarding the spectrum of lesions encountered in routine dermoscopic referral practice and whether the relative distribution of diagnostic categories changes over time within such clinical settings. These patterns may be influenced not only by disease occurrence but also by referral practices, patient selection, healthcare access, clinical awareness, and the characteristics of the population attending a dermatology referral center. This evidence gap is particularly relevant to Southeastern Europe, where longitudinal data describing the distribution of dermoscopically evaluated skin lesions remain limited. Published data specifically characterizing the diagnostic spectrum and temporal patterns of melanocytic, keratinocytic, premalignant, and other dermoscopically evaluated lesions in Albania are scarce. Consequently, it remains unclear whether patterns reported from other European and international populations adequately reflect those encountered in Albanian dermatology referral practice. Population-based studies reporting changes in melanoma incidence and mortality provide important epidemiological context but differ fundamentally from referral-center studies. A clinic-based dataset represents a selected population of patients presenting or being referred for dermatological assessment and therefore cannot be used to estimate population-level incidence or mortality. Accordingly, changes in the frequency or proportion of melanoma within such a dataset should be interpreted as changes in the diagnostic composition of the evaluated clinical population rather than as evidence of changes in melanoma incidence in the general population.

Aim of the Study: The present study aimed to characterize the diagnostic distribution, demographic characteristics, and temporal patterns of dermoscopically evaluated melanocytic and non-melanocytic skin lesions among 1,219 consecutive patients at a dermatology referral center in Tirana, Albania, over a six-year period from January 2020 through December 2025. The study was specifically designed to evaluate patterns within the dermoscopically assessed clinical population and not to estimate population-level incidence of melanoma or other skin cancers.

Materials and Methods

Study Design and Setting:

This retrospective observational study included consecutive patients who underwent dermoscopic evaluation of clinically suspicious skin lesions between January 2020 and December 2025 at EB Dermatology Clinic, a dermatology referral clinic in Tirana, Albania. Patients presenting with skin lesions considered to warrant specialist dermoscopic evaluation on clinical grounds were eligible for inclusion. Clinical indications for dermoscopic assessment included suspicious or changing pigmentation or morphology, asymmetry, irregular borders or colors, persistent or progressive lesions, ulceration or bleeding, or other clinical characteristics raising concern for a melanocytic or non-melanocytic neoplasm. A total of 1,219 consecutive patients were included. Each patient contributed one clinically selected lesion to the analysis, resulting in 1,219 dermoscopically evaluated lesions and 1,219 corresponding diagnoses. Each lesion was assigned one specific dermoscopic diagnosis. No patient contributed more than one lesion or diagnosis; therefore, all observations were independent at the patient level. No patients were excluded from the final analysis.

DermoscopicAssessment: Dermoscopic examinations were performed by two dermatologists using the FotoFinder Vexia imaging system. Both dermatologists followed the same predefined diagnostic approach and applied identical dermoscopic assessment/ criteria throughout the study period. Pattern analysis included assessment of lesion symmetry, colors, pigment network, dots and globules, streaks, regression structures, vascular patterns, and other diagnosis-specific dermoscopic features. Established dermoscopic criteria for melanocytic and non-melanocytic lesions were applied consistently during examination [1,2]. Based on the dermoscopic assessment, lesions were classified into the following predefined diagnostic categories:

- benign melanocytic and dermal lesions;
- premalignant melanocytic and keratinocytic lesions;
- melanoma;
- basal cell carcinoma;
- squamous cell carcinoma;
- dysplastic nevi;
- other dermatological diagnoses.

Histopathological examination was performed whenever clinically indicated as part of routine patient management. For each patient, the following variables were recorded: year of diagnosis, age at diagnosis, sex, and dermoscopic diagnosis.

Temporal Grouping: For descriptive temporal comparisons, the six-year study period was divided into three consecutive intervals of equal duration: 2020–2021, 2022–2023, and 2024–2025. Two-year intervals were selected to provide comparable observation periods and to reduce year-to-year variability associated with relatively small numbers within some individual diagnostic categories. The earliest interval, 2020–2021, served as the reference period for temporal comparisons when applicable. Associations between categorical variables were evaluated using the chi-square test, as appropriate. Odds Ratios (ORs) with corresponding 95% Confidence Intervals (CIs) were used for predefined group comparisons where applicable. Statistical significance was defined as a two-sided p value < 0.05. The assumptions underlying categorical comparisons, including adequacy of expected cell frequencies for chisquare testing, were considered when selecting the statistical test. Pearson correlation analysis was not retained in the revised analysis because the temporal dataset comprised only three aggregated two-year intervals, which was considered insufficient for a robust correlation-based assessment of temporal trend.

Ethical Considerations: The study was conducted in accordance with the ethical principles of the Declaration of Helsinki and received approval from the relevant Ethics Committee. All patients provided informed consent permitting the use of their anonymized clinical and dermoscopic data for research purposes. Patient confidentiality was maintained throughout data collection, analysis, and reporting, and no patientidentifiable information was included in the study.

Results

Overall Study Population: A total of 1,219 patients, each contributing one dermoscopicallyevaluated lesion, were included in the analysis. The largest number of patients was evaluated during 2020– 2021, comprising 501 cases (41.1% of the overall study population), followed by 417 cases (34.2%) in 2022–2023 and 301 cases (24.7%) in 2024–2025, **(Table 1)**.

Table 1: Distribution of patients and dermoscopically evaluated lesions according to study period.

Study period	Patients/lesions	N% of total
2020-2021	501	41.1
2022-2023	417	34.2
2024-2025	310	24.7
Total	1.219	100.0

Overall, 691 patients (56.7%) were female and 528 (43.3%) were male, corresponding to a female-to-male ratio of approximately 1.31:1. Benign melanocytic and dermal lesions represented the most frequen diagnostic category, accounting for 415 cases (34.0%). These were followed by other dermatological diagnoses (254; 20.8%), BCC (173; 14.2%), dysplastic nevi (132; 10.8%), melanoma (88; 7.2%), premalignant melanocytic and keratinocytic lesions (88; 7.2%), and SCC (69; 5.7%), **(Figure 1)**.

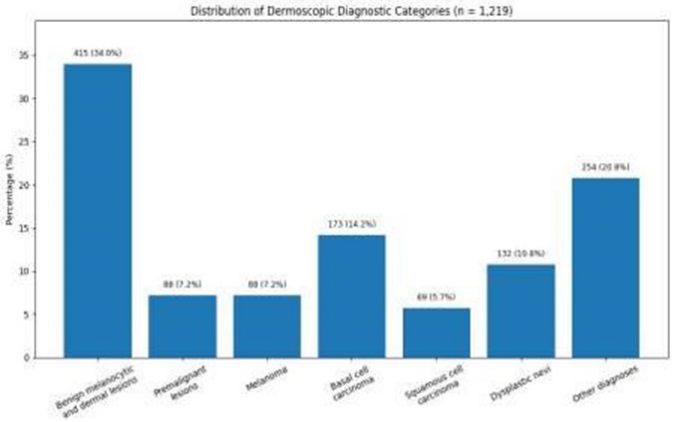

Figure 1: Distribution of dermoscopic diagnostic categories.

Melanoma: A total of 88 melanoma diagnoses were recorded during the six-year study period. The absolute number of melanoma diagnoses was 36 during 2020– 2021, 33 during 2022–2023, and 29 during 2024–2025. When expressed relative to the total number of patients evaluated during each corresponding interval, melanoma represented 7.2% (36/501) in 2020–2021, 7.9% (33/417) in 2022–2023, and 9.6% (29/301) in 2024–2025. Thus, although the absolute number of melanoma diagnoses decreased across the three periods, the relative proportion of melanoma among all dermoscopically evaluated lesions increased. This observation should be considered in the context of the simultaneous decline in the total number of patients evaluated. The mean age of patients diagnosed with melanoma was 46.1 years in 2020–2021, 41.1 years in 2022–2023, and 42.0 years in 2024–2025. During the first period, melanoma occurred equally among males and females (18 males and 18 females). During 2022–2023, 16 cases occurred in males and 17 in females, whereas during 2024–2025, 17 occurred in males and 12 in females. Age-stratified analysis showed that 78 of the 88 melanoma diagnoses (88.6%) occurred in patients older than 25 years, whereas 10 (11.4%) occurred in patients aged 25 years or younger **(Table 2, Figure 2)**.

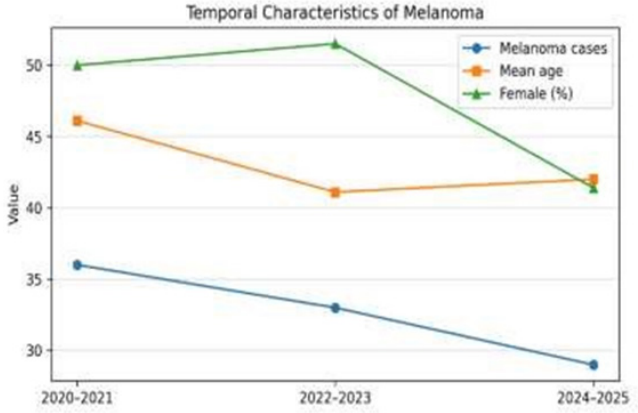

Figure 2: Distribution and demographic characteristics of melanoma diagnoses across the three study periods.

Basal Cell and Squamous Cell Carcinoma: During the study period, 173 basal cell carcinomas (BCCs) and 69 squamous cell carcinomas (SCCs) were diagnosed. The mean age of patients was comparable between the two groups (43.4 years for BCC and 43.5 years for SCC). However, marked differences were observed in sex distribution. SCC showed a pronounced male predominance, with males accounting for 69.6% of all cases, whereas BCC demonstrated a more balanced distribution between sexes, with females representing 46.2% of patients. The difference in sex distribution between SCC and BCC was statistically significant (χ^2 test, p = 0.024) **(Table 3, Figure 3)**.

Table 3: Comparison between Basal Cell and Squamous Cell Carcinoma.

Diagnoses	n	Mean age (years)	Male/ female	Female (%)
Squamous cell Carcinoma	69	43.5	48/21	30.4
Basal Cell Carcinoma	173	43.4	93/80	46.2

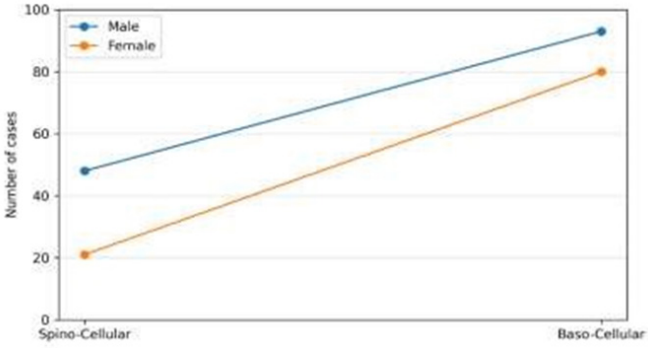

Figure 3: Comparison between Basal Cell and Squamous Cell Carcinoma.

Table 2: Characteristics of melanoma diagnoses according to study period.

Study period	Melanoma n	Melanoma period %	Mean age, years	Male/female n	Female %
2020-2021	36	7.2	46.1	18/18	50.0
2022-2023	33	7.9	41.1	16/17	51.5
2023-2024	29	0.6	42.0	17/12	41.4
2024-2025	88	-	-	-	-

Percentages in the third column represent the number of melanoma diagnoses divided by the total number of patients/lesions evaluated within the corresponding two-year period.

Discussion

This retrospective study describes the diagnostic spectrum and temporal patterns of dermoscopically evaluated skin lesions among patients attending a dermatology referral center in Albania over a six-year period. Its principal contribution is the characterization of a clinical population from a region for which longitudinal dermoscopy-based data remain limited. An important observation was the difference between the absolute number and relative proportion of melanoma diagnoses. Although the absolute number of melanoma diagnoses decreased across the three two-year periods, melanoma represented an increasing proportion of all dermoscopically evaluated lesions. This finding should not be interpreted as evidence of an increase in population-level melanoma incidence. The total number of patients evaluated declined substantially, from 501 in 2020–2021 to 301 in 2024–2025, directly affecting the denominator used to calculate melanoma proportions. Therefore, the increase in the relative proportion of melanoma primarily reflects a change in the diagnostic composition of the evaluated clinical population. Several unmeasured factors may have contributed to the decline in evaluation volume and to differences in diagnostic distribution across the study periods. These include changes in referral volume and referral criteria, physician practice, patient awareness, healthcare access, and the characteristics of patients presenting for specialist assessment. Because these factors were not systematically recorded, their individual contribution to the observed patterns cannot be determined. Previous studies have demonstrated that dermoscopy can improve melanoma recognition and diagnostic performance compared with naked-eye examination.[1,2] Increased use of dermoscopy has also been associated with the detection of thinner melanomas in other clinical settings [6]. However, the present study was not designed to evaluate diagnostic accuracy, sensitivity, specificity, or changes in diagnostic performance. Therefore, the observed temporal patterns should not be interpreted as evidence that diagnostic accuracy improved over the study period. Population-based studies have reported changes in melanoma incidence and mortality in several countries [5,7]. Such studies provide relevant epidemiological context but are methodologically different from the present referral-based analysis. Our dataset represents patients undergoing specialist dermoscopic assessment and does not provide a population denominator. Direct conclusions regarding changes in melanoma incidence or mortality in Albania therefore cannot be drawn from these data. Melanoma occurred predominantly in patients older than 25 years. The mean ages observed in this study were relatively young and should be interpreted cautiously. The study population represents a selected referral-based clinical population rather than all melanoma cases occurring in the general population. Differences in referral patterns, healthcare-seeking behavior, and the age distribution of patients attending the clinic may therefore have influenced the observed mean ages. Comparison with larger regional and population-based melanoma datasets will be necessary to determine whether this pattern is representative of the broader Albanian population. A significant difference in sex distribution was observed between SCC and BCC, with a greater male predominance among SCC cases. Similar sex-related differences have been reported in previous epidemiological studies [8-10]. Cumulative ultraviolet exposure, occupational exposure, and differences in photoprotective behavior have been proposed in the literature as potential contributors to sex-related differences in keratinocyte carcinoma [8-13]. However, these factors were not measured in the present study, and no causal explanation for the observed sex difference can therefore be established from our data. population when interpreting diagnostic frequencies. Monitoring the distribution of lesions evaluated in dermatology referral centers may contribute to understanding clinical workload, identifying changes in referral patterns, and planning diagnostic and skin cancer surveillance services. The findings also emphasize the distinction between referral-based diagnostic patterns and population-level epidemiological trends. While clinical datasets can provide useful information about the types of lesions encountered in specialist practice, population-based registries and multicenter prospective studies are required to determine whether these patterns correspond to broader changes in skin cancer epidemiology.

Limitations: Several limitations should be considered when interpreting the findings. First, the retrospective design may have introduced selection bias. Second, the study was conducted at a single dermatology referral center, and the evaluated patients may not be representative of the general Albanian population. Third, histopathological confirmation was not available for all lesions because biopsy was performed only when clinically indicated as part of routine clinical management. Therefore, the study describes primarily dermoscopically assigned diagnostic categories rather than universally histopathologically confirmed diagnoses. Fourth, the number of patients evaluated differed substantially between the three study periods, declining from 501 in 2020–2021 to 301 in 2024–2025. This difference affects comparisons of diagnostic proportions across periods. Changes in referral practices, physician behavior, patient awareness, healthcare access, and referral criteria may also have influenced the number and characteristics of patients evaluated, but these factors were not measured. Finally, the study was not designed to assess diagnostic.

Clinical Implications: From a clinical perspective, the findings illustrate the heterogeneous spectrum of lesions encountered in dermoscopic referral practice and highlight the importance of considering the underlying referral accuracy or population-level incidence. Consequently, the findings should be interpreted as patterns within a referral-based dermoscopically evaluated population and should not be generalized to melanoma or skin cancer incidence in Albania.

Conclusion

This six-year retrospective study identified temporal and demographic variation in the spectrum of skin lesions dermoscopically evaluated at an Albanian dermatology referral center. Although the absolute number of melanoma diagnoses decreased across the three study periods, melanoma represented an increasing proportion of all evaluated lesions. This finding should not be interpreted as evidence of increasing population-level melanoma incidence, particularly because the overall number of patients undergoing dermoscopic evaluation declined over time. A significant sex-related difference was also observed between SCC and BCC, with greater male predominance among SCC cases. The study provides referral-based data from Albania and contributes to addressing the limited literature describing dermoscopic diagnostic patterns in Southeastern Europe. Larger prospective, multicenter, and population-based studies are needed to determine whether the patterns observed in specialist dermatology practice correspond to broader epidemiological trends. Data Availability Statement: The data analyzed in this study were derived from retrospective clinical records and are not publicly available because of patient privacy and

data-protection considerations. Anonymized aggregate data supporting the findings of this study may be made available by the corresponding author upon reasonable request, subject to applicable ethical and institutional requirements. No patient identifiable information will be shared.

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